

# Carnegie Mellon University Silicon Valley

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# Managing Interoperability: *What Happens When We Succeed?*

Presenter

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# Is Interoperable Radio The New “Party Line”?



**The Telephone Doors  
of the Nation**

# A Few Things We Used To Get For Free...

## **Shared Situational Awareness**

- Unit Assignments and Location (approximately)
- Operational Tempo
- Human Affect

## **Simple Routing**

- Push-to-Talk
- Occasional User-Directed “Patching”

## **Localized Network Management**

- Callsigns (“namespace”)
- Codes and Procedures
- A-Priori Knowledge of Network Membership

## **Access Control**

- Physical Security of Devices
- Type Acceptance
- Expense

# ...That Now We Have To Work For.

## **Creating Situational Awareness**

- Person-to-person calling often replaces shared channel
- Data increasingly replaces voice

## **Managing Sophisticated Routing**

- Who's who?
- Where in the network are they?
- How do we reach them?

## **Globalized Network Management**

- Mapping capabilities to entities
- Mapping roles to entities
- Global semantics and procedures

## **Access Control**

- Encryption key management
- Identity management



# We've embraced the Incident Command System (ICS)



(U.S. OSHA)



(FEMA photo)

But we still struggle  
with scale...



(NYPD)



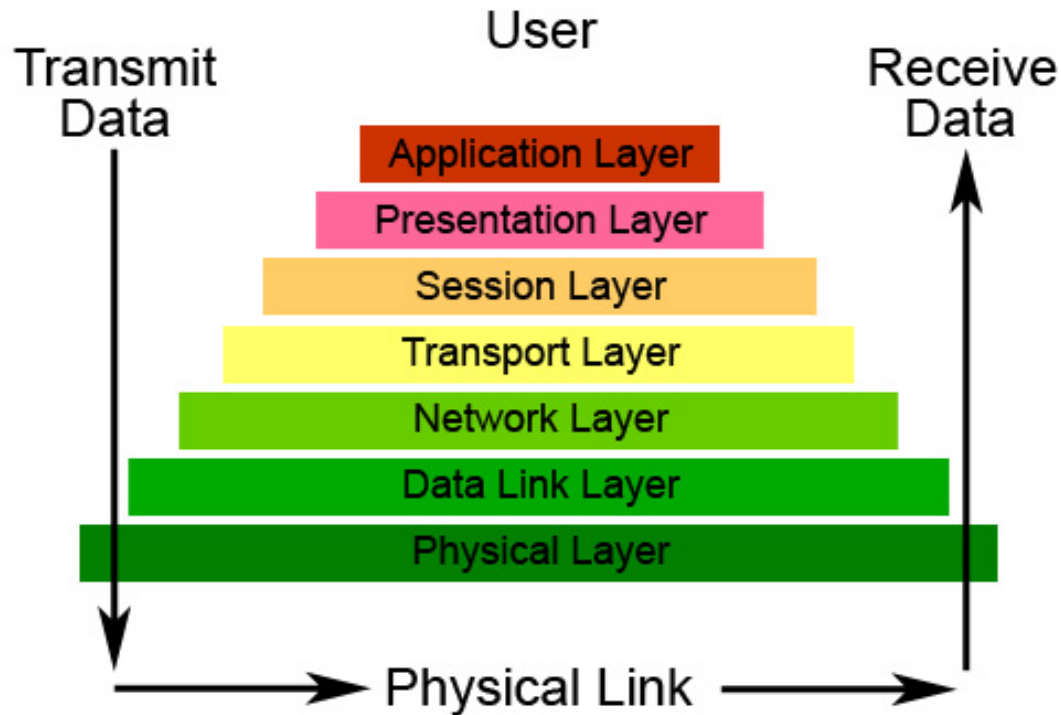
(NOAA)

...and with speed.

We've made great progress, but  
our work is not finished.



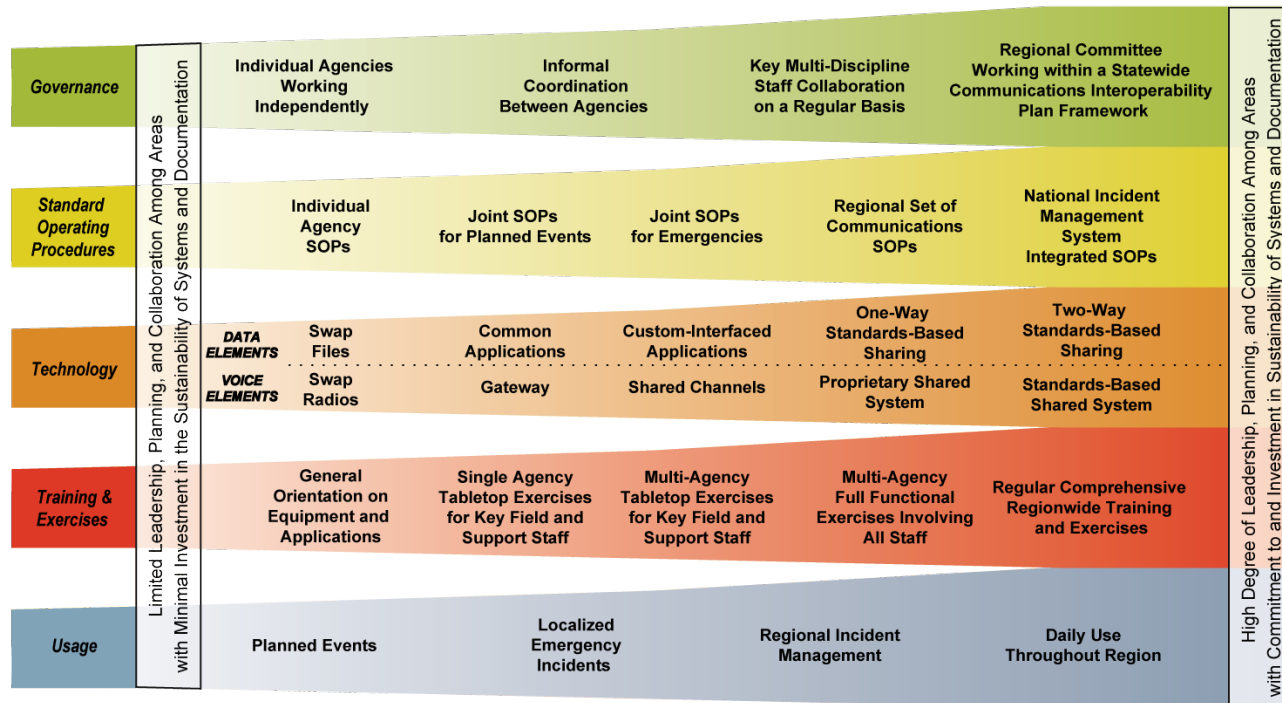
# Thinking “Stackwise”:



## The OSI Model

*(University of Washington graphic)*

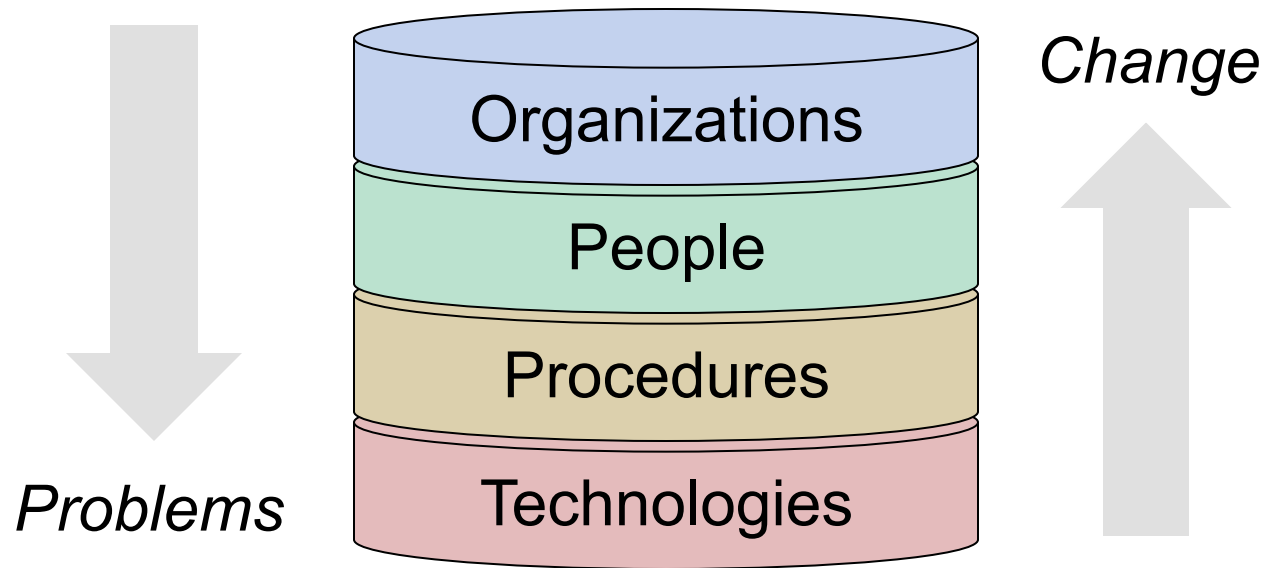
# Thinking “Stackwise”:



## The SAFECOM Continuum

(DHS graphic)

## Thinking “Stackwise”:



## The Four Layers of EMCOMM

*(Botterell circa 1989)*

# Challenges of Discovery and Management

## **Recognizing a new entity on the network**

- Person-to-person calling often replaces shared channel
- Data increasingly replaces voice

## **Determining the entity's capabilities**

- Competence: Certification, training, experience
- Capacity: Size, type and duration (expendables)
- Location and mobility

## **Assigning and updating roles**

- Granting (and revoking) privileges
- Managing joint and shared roles
- Who can assign what to whom?

## **Authenticating communications**

- Encryption and digital signatures
- All relies on credible identity
- So what is identity, anyhow?

# Analogs From Computer Networking

- **Domain Name System** (DNS, wide area networks)
- **Dynamic Host Configuration Protocol** (DHCP, local area networks)
- **Jini** (Java objects)
- **Session Announcement Protocol** (SIP, largely telephony)
- **Universal Description Discovery and Integration** (UDDI, web services)
- **WS-Discovery** (web services)
- **XMPP Service Discovery** (for “Jabber”)
- **eXtensible Resource Descriptor Sequence** (XRDS, OpenID, OAuth, etc.)
- **The Semantic Web** (distributed representation model)
- **Google** (central service model)

***Who will choose an approach, and how?***



Interoperability is a wonderful thing.  
Now where's the phone book?



# Disaster Management Initiative

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